‘MiniSenzor’ for Humanitarian Noninvasive Chemical Identification of UXO Fillers

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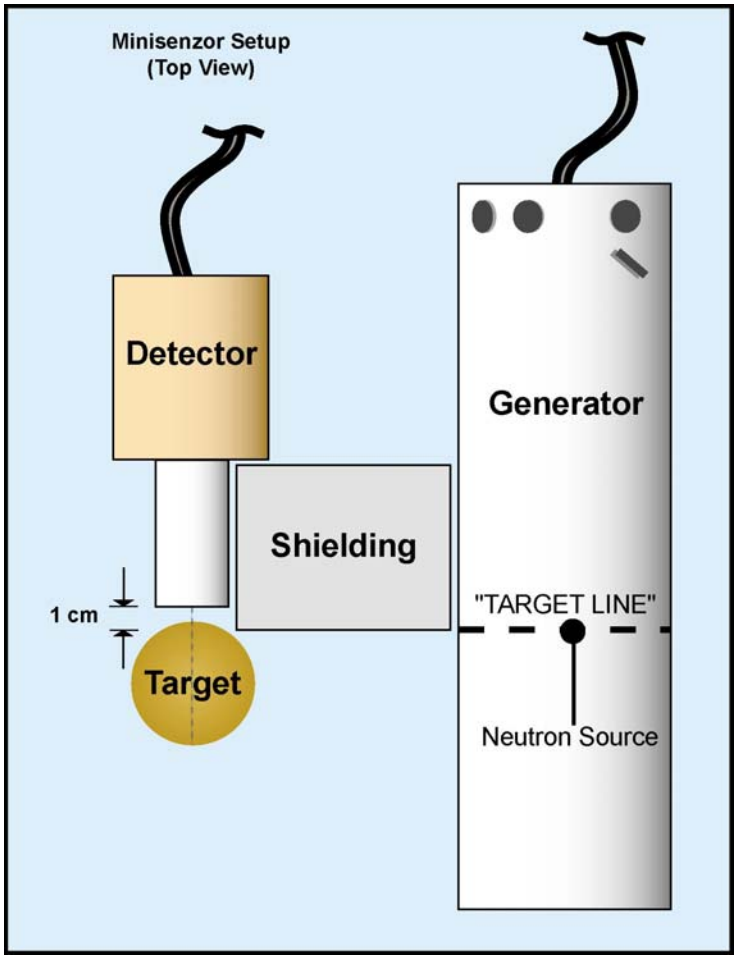
MiniSenzor



- **Weights:**
  - **Neutron generator: 34lb (~15.5 kg)**
  - **HPGe detector: 25 lb(~11.4 kg)**
  - **Shielding :72 lb (~33kg)**
- **Power consumption: 75W**

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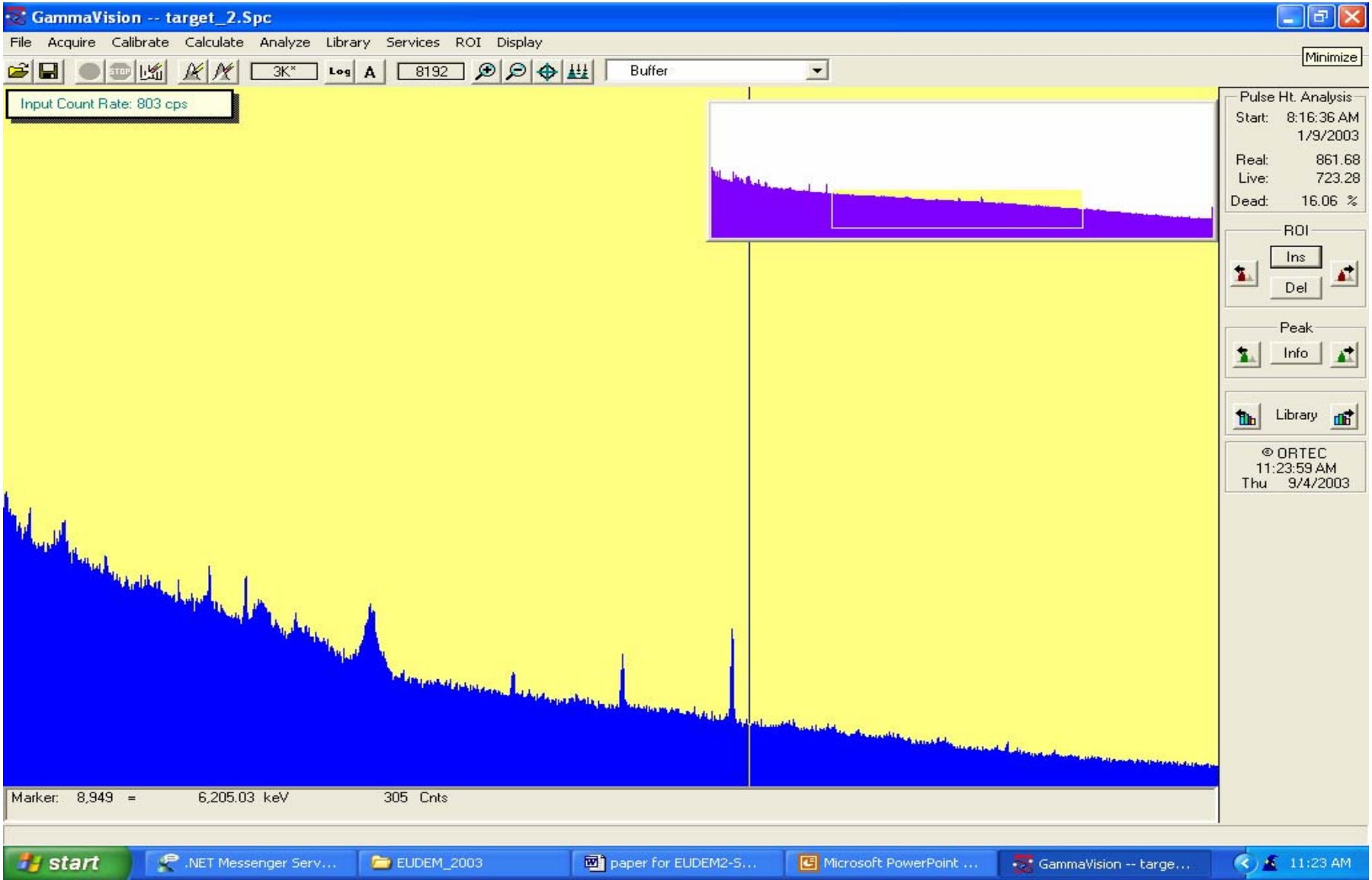
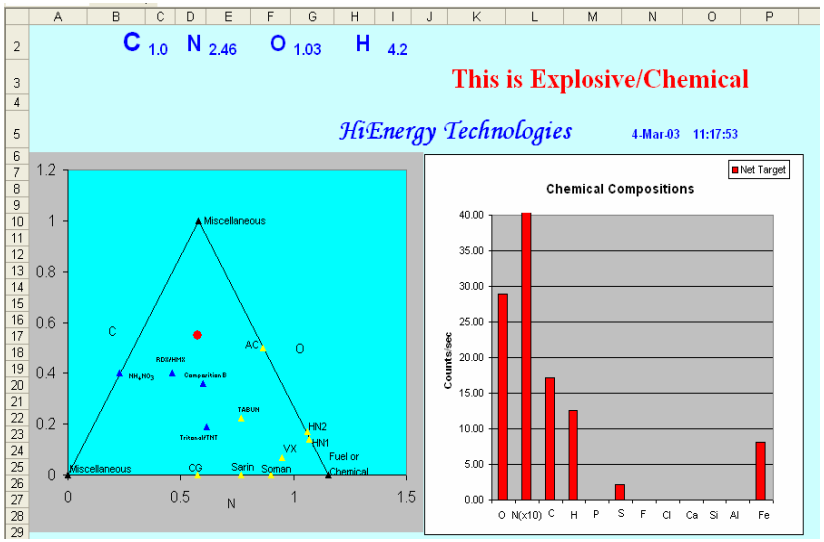
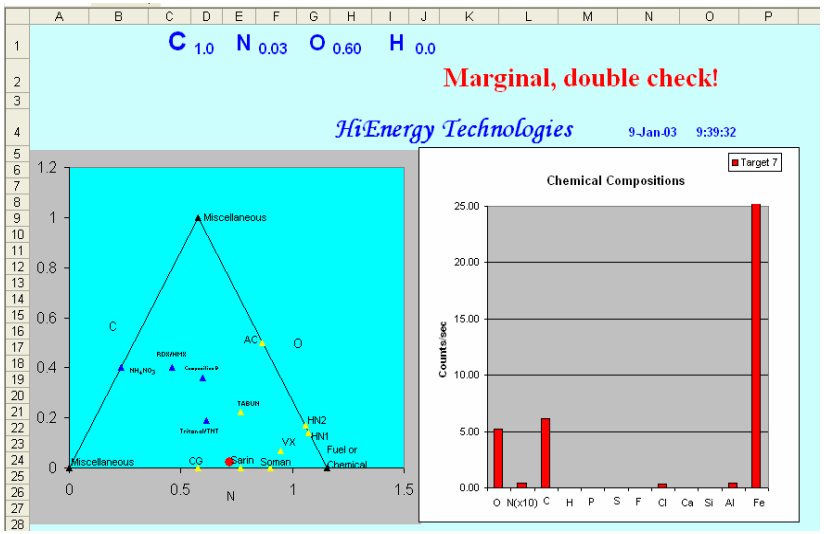
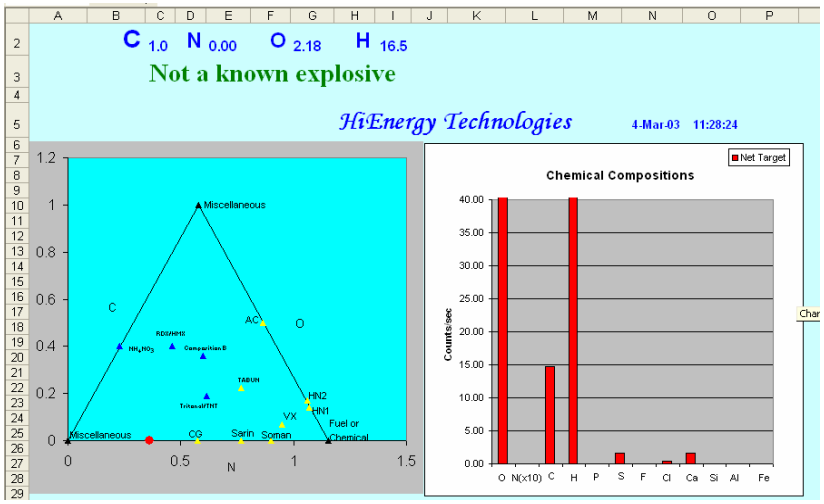
High Resolution Spectrum

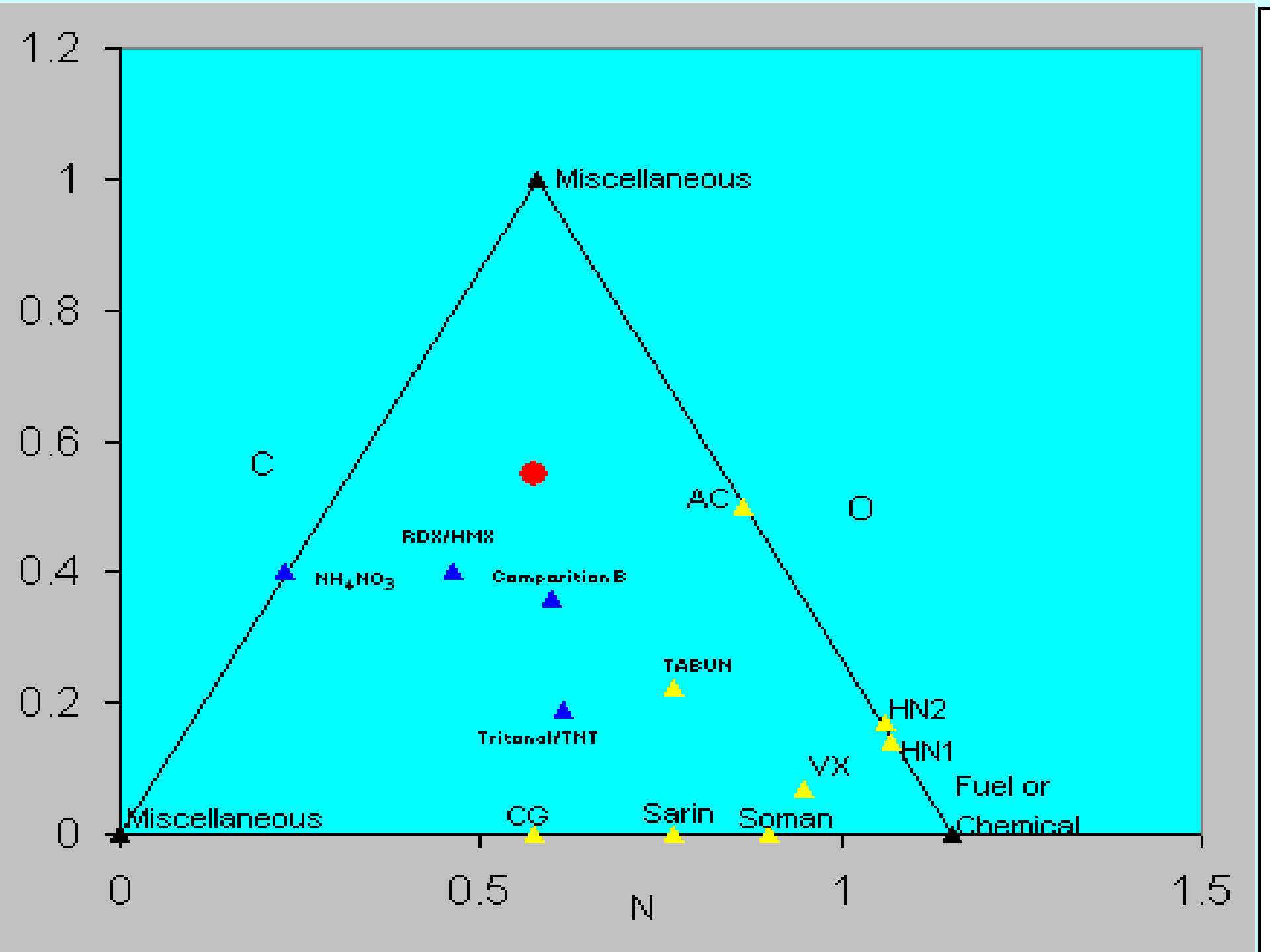


Result Displays








1.2
1
0.8
0.6
0.4
0.2
0
0
0.5
1
1.5
N
Miscellaneous
C
O
AC
RDX/HMX
NH4NO3
Comparition B
TABUN
Tritonal/TNT
HN2
HN1
VX
Fuel or
Chemical
Miscellaneous
CG
Sarin
Soman

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UXO Detections

Tests at the US Department of Defense with real explosives.

Experimental set up at UCI with simulated explosives.

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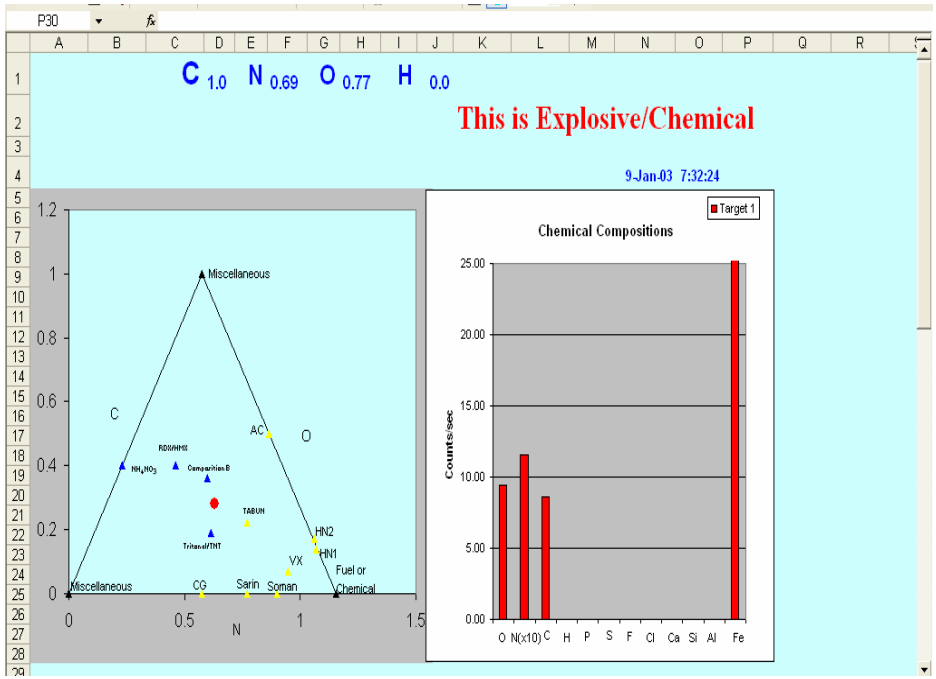

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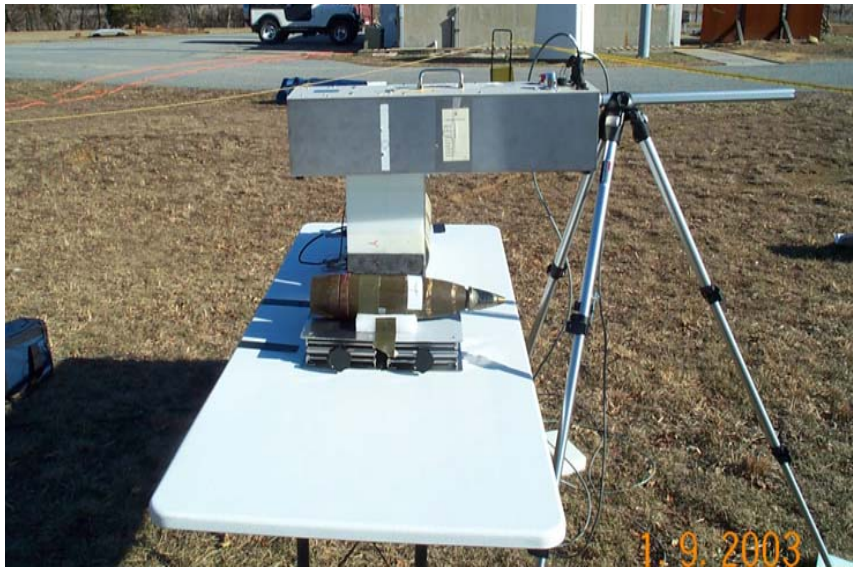

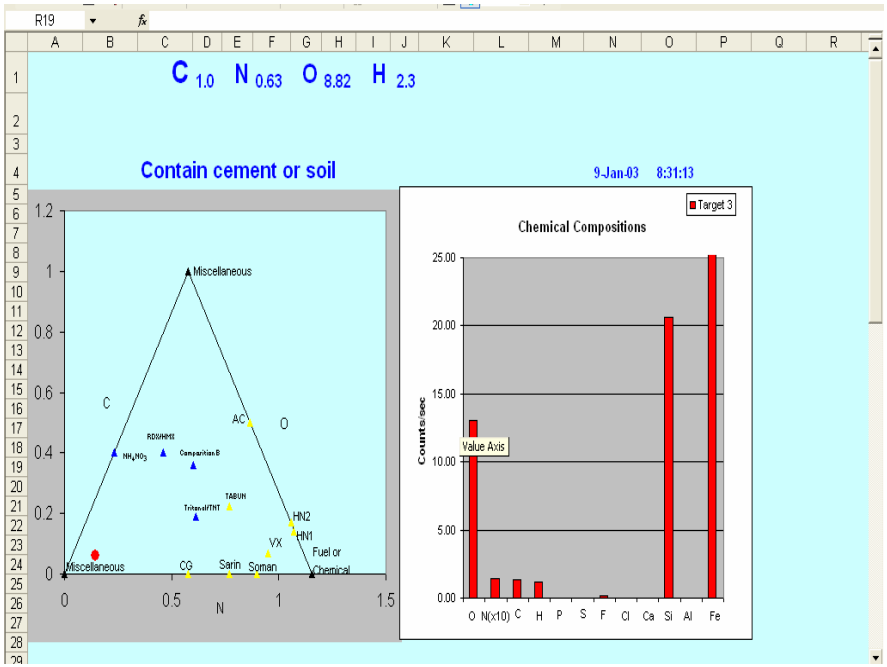

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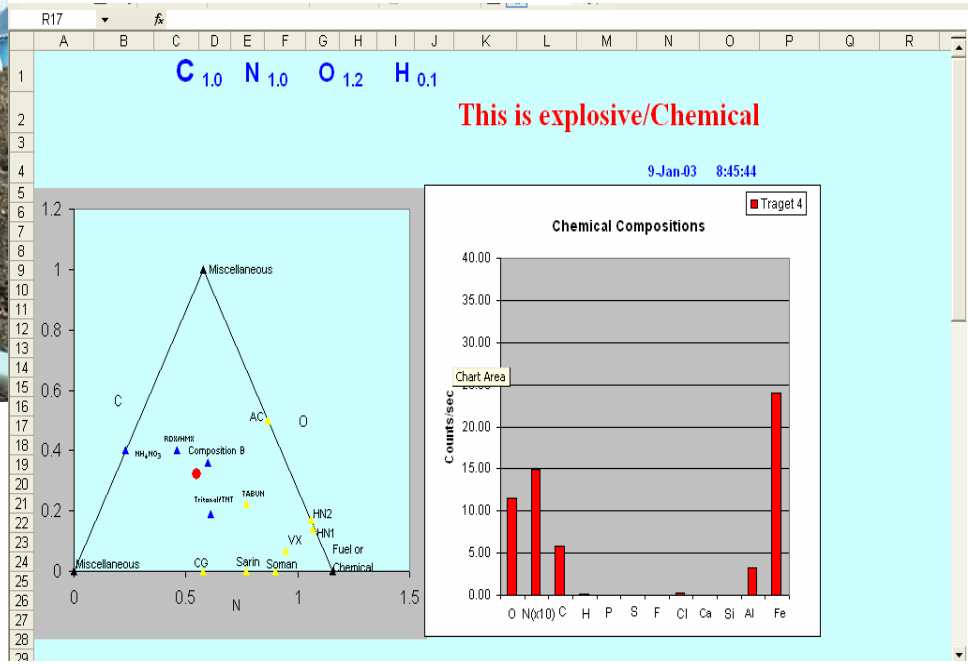
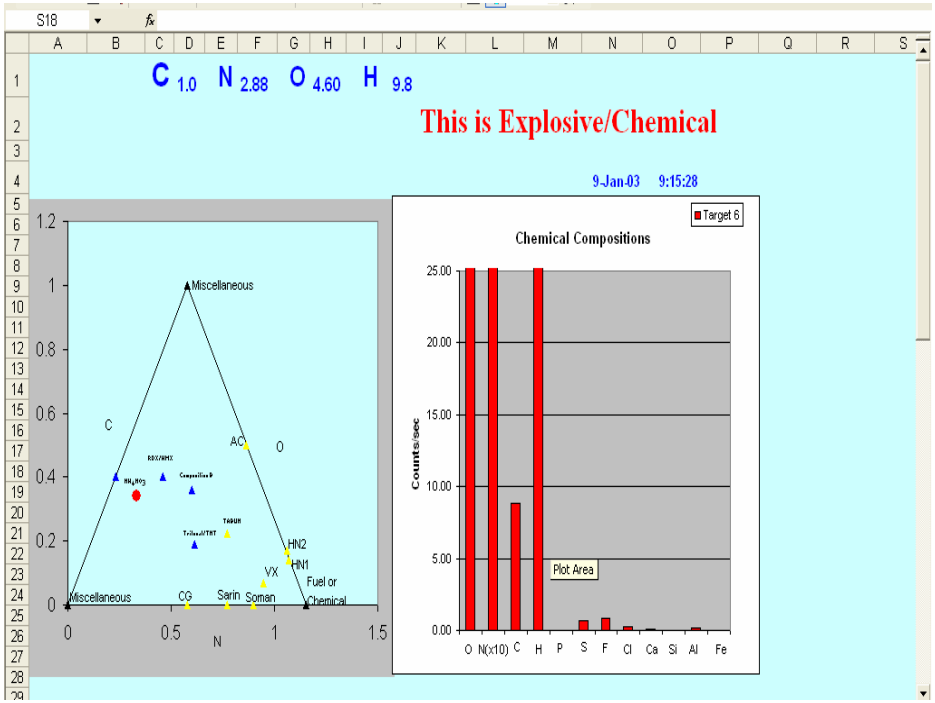
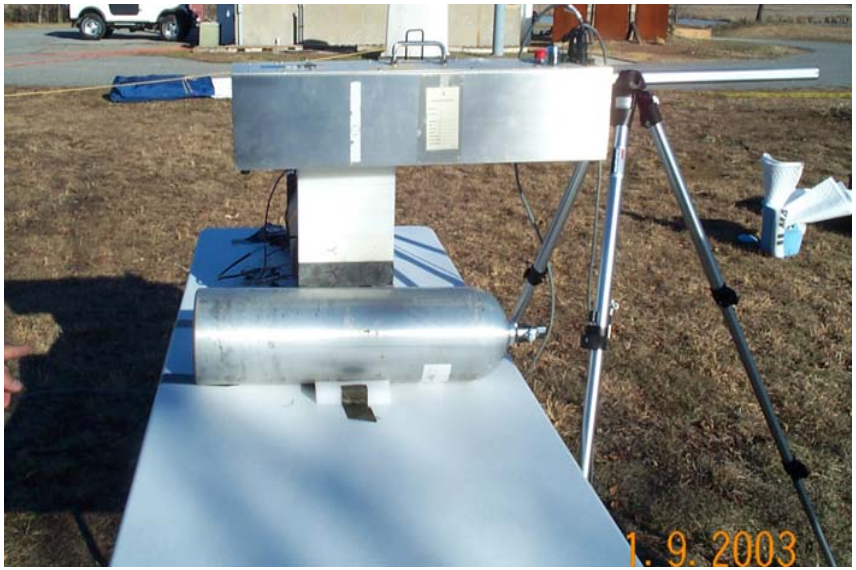
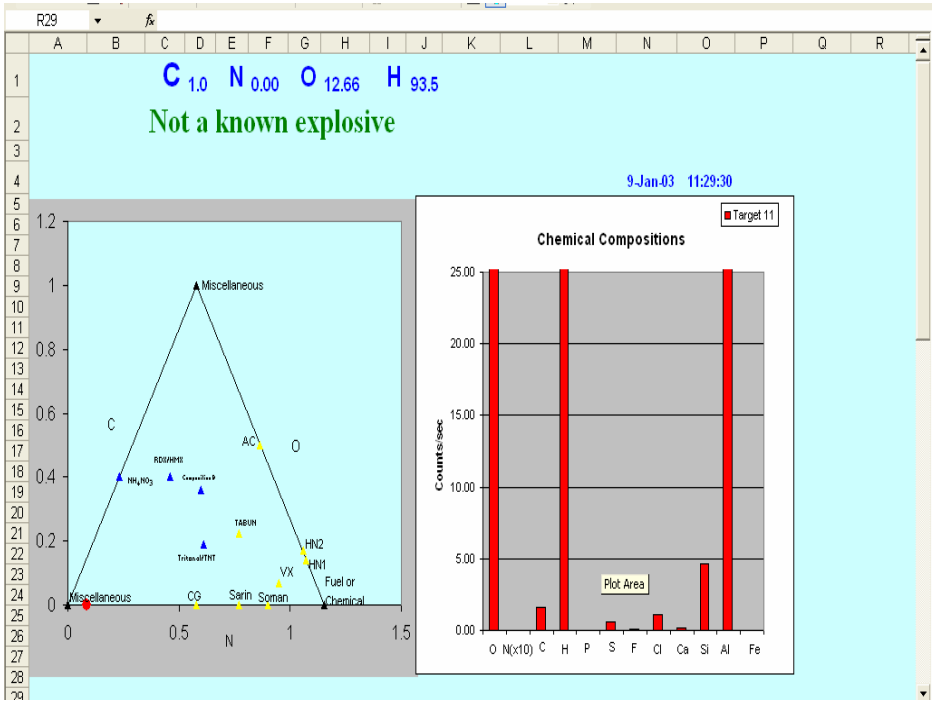



1. 9. 2003


C 1.0 N 2.88 O 4.60 H 9.8
This is Explosive/Chemical
9-Jan-03 9:15:28
Miscellaneous
C
AC
O
HN2
HN1
VX
Fuel or Chemical
Miscellaneous
CG
Sarin
Soman
N
Target 6
Chemical Compositions
Counts/sec
Plot Area
O N(x10) C H P S F Cl Ca Si Al Fe

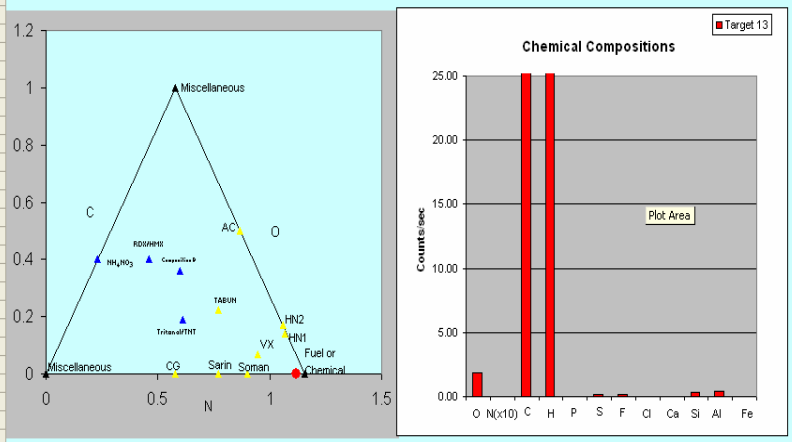

1. 9. 2003


C 1.0 N 0.00 O 12.66 H 93.5
Not a known explosive
9-Jan-03 11:29:30
Miscellaneous
C
AC
O
HN2
HN1
VX
Fuel or Chemical
Sarin
Soman
CG
TABUN
N
Target 11
Chemical Compositions
Counts/sec
Plot Area
O N(x10) C H P S F Cl Ca Si Al Fe

C 1.0 N 0.00 O 0.03 H 10.5

Not a known explosive

9-Jan-03 12:09:32



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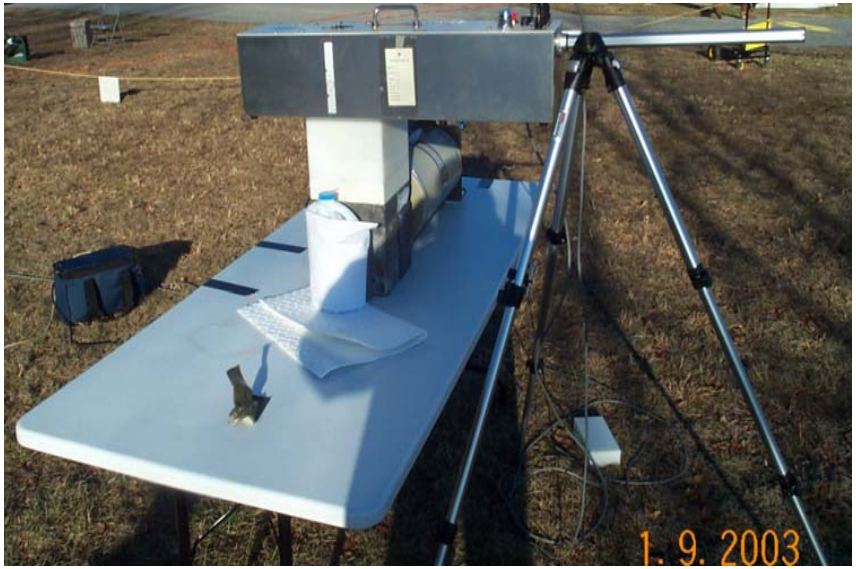

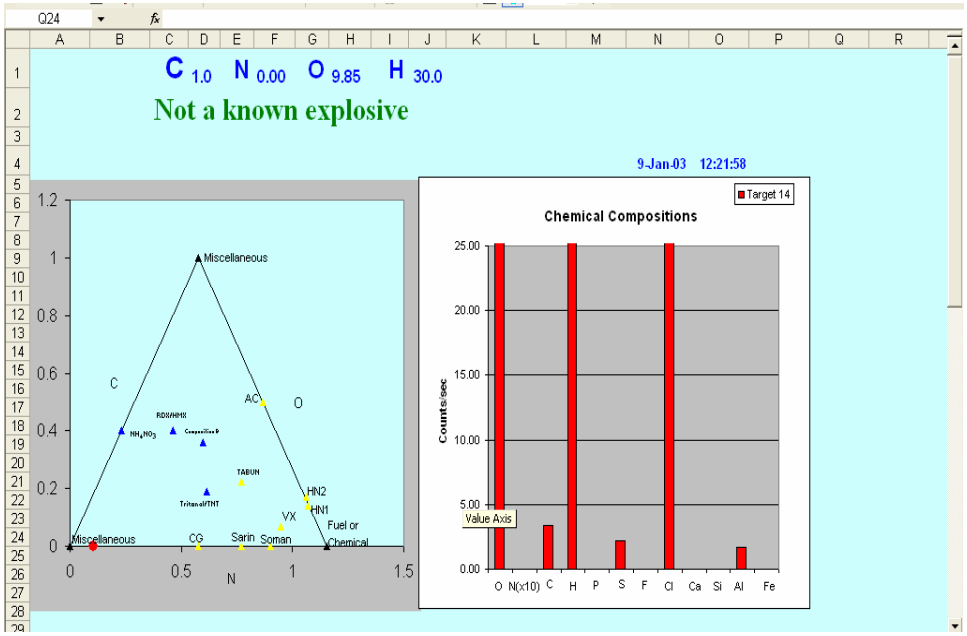

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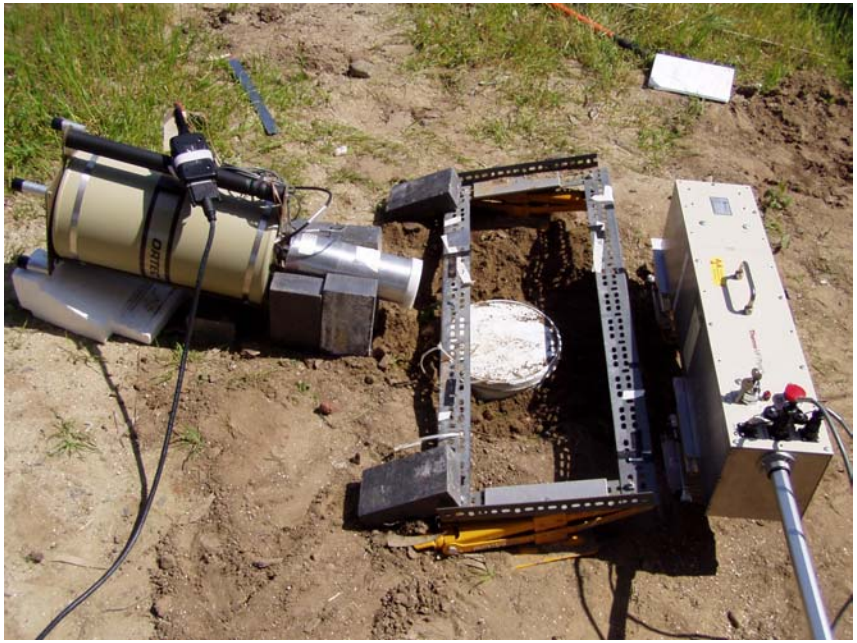
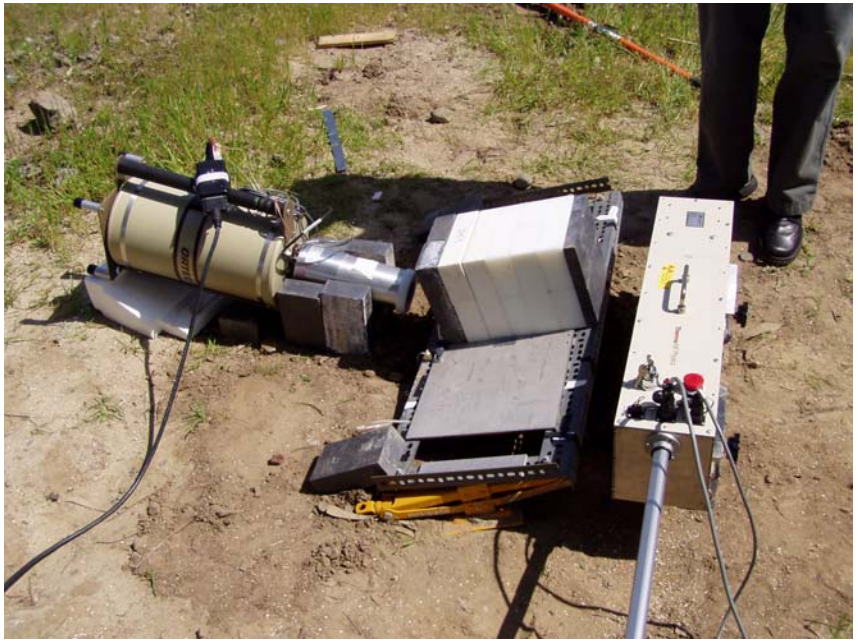
UXO Test Result

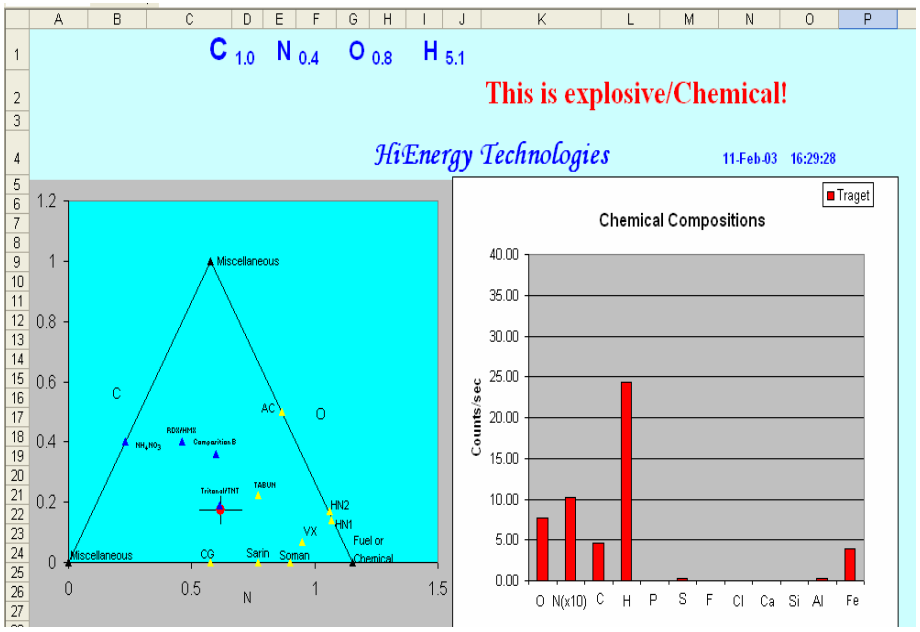
- **100% identification rate overall of whether or not the target was explosive.**
- **80% correct identification rate of specific type of explosive or inert material.**
- **Average of 12.3 minutes interrogation and decision time.**

Landmine Detections

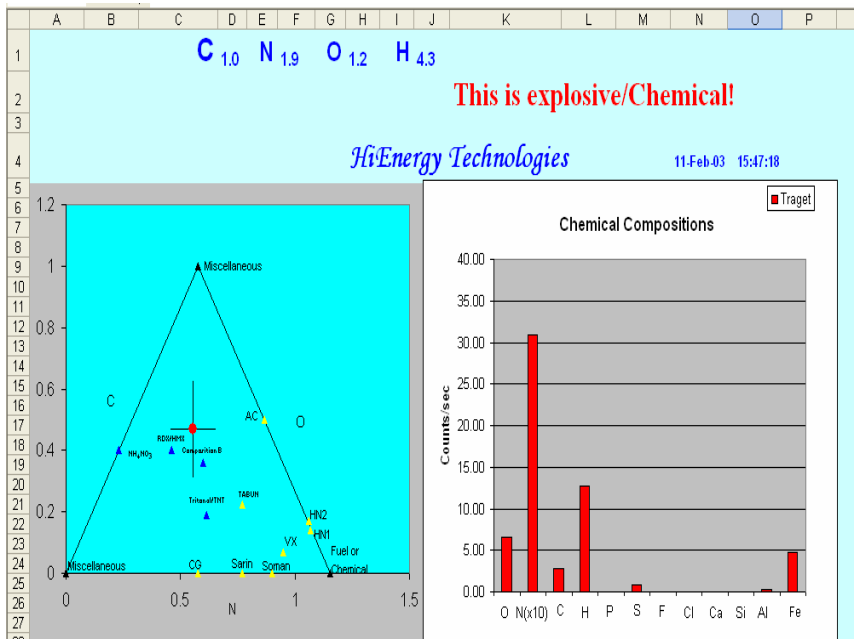




Results from the Landmine Detections



5 kg TNT simulant



5 kg RDX simulant

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CONCLUSIONS

- **MiniSenzor is portable and able to detect a variety of UXO fillers both on a table and the ground *without database*.**
- **The minimum detectable TNT on a table 75 cm above the ground is 0.114 kg.**
- **The minimum detectable TNT is 2.3 kg on the ground.**
- **The MiniSenzor is able to detect a 5 kg AT landmine simulant buried up to 2.5 cm of soil.**
- **In order to detect smaller amount of UXO filler on the ground or deeper landmines, a tagged atometer which has directionality needs to be used; such technology has been developed and is named SuperSenzor. The operational principles of SuperSenzor will be presented in a different paper (this conference).**